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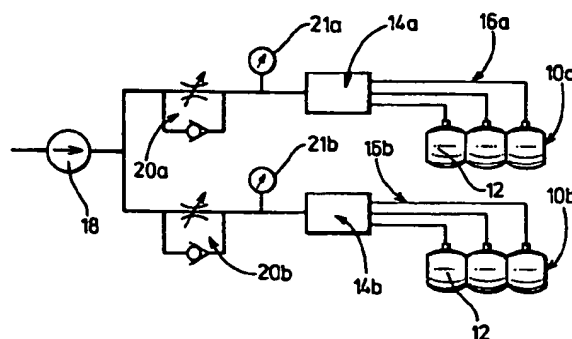
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54 **A device for air-massage.**

57 A device for air-massage comprises a plurality of associated air inflatable bags (12), a change-over valve mechanism (14a,b) connected to the bags (12), and air-feeding and exhausting means attached to the change-over valve mechanism (14a,b). The air-inflatable bags (12) are moved sequentially in a wavy manner through operation of the change-over valve mechanism (14a,b).



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A device for air-massage

This invention relates to a device for air-massage in which a plurality of air inflatable bags each having air-feeding and exhausting ports are arranged and a compressed air is fed to and exhausted from each bag for producing varied movements to have an efficient massage effect
5 on an outer body surface.

Heretofore, various types of massaging devices have been proposed in one of which an air inflatable bag made of a flexible material such as rubber is wound around a body portion such as an arm or a leg and
10 the bag is inflated and deflated with a compressed air to apply and release pressure on a blood vessel, thereby to facilitate a circulation of blood (mainly venous blood and lymph) for massage.

The conventional device for air-massage, however, has such the
15 disadvantages that the air bag is inflated into a cylindrical form when filled with the air, so that an arched surface of the bag comes into uneven contact with the body portion. As a result, a pressure is localized with a minimum stimulus to give uncomfortable
20 feeling to the body portion. In other words, over all even contact of the inflated bag with the body portion is difficult to obtain, so that a satisfactory massage effect may not be achieved.

Further, when a muscle of the diseased part becomes tense and stiff causing extremely bad flow of blood and lymph, a simple press and release
25 of the diseased part may afford instantaneous comfort but not sufficient massage effect.

BAD ORIGINAL

The inventor has now found out that a good massage effect may be obtained by an assembly comprising a plurality of air inflatable bags to which air is alternately fed or exhausted for giving a variety to the pressing or releasing positions on a blood vessel of the diseased part, and a suitable change-over valve mechanism connected to air-feeding means for continuous air-feeding and exhausting operations.

As the result of further diligent study for developing an air-massage device having a change-over valve mechanism which eliminates all the disadvantages of the conventional air-massage devices described hereinbefore and readily produces a variety of massage effects in spite of its simple construction, the inventor has now improved a device for air-massage containing a rotatable change-over valve mechanism capable of ensuring communication of any one of the air-feeding and exhausting ports with an air-feeding means. The improvement resides in that the change-over valve mechanism is provided with a set of distributing plates having two or three air-feeding and exhausting ports or channels circumferentially spaced apart equiangularly, for example at about 120° , the distributing plates are fitted concentrically with rotators each having bored passages which allow the air-feeding and exhausting ports of the distributing plates to communicate selectively with the air-feeding means or air-exhausting means, and the rotators are driven simultaneously to rotate by a motor. Thus, an air is fed to one of air-inflatable bags through one of rotators while air is exhausted from other one of inflatable bags through another rotator, producing a variety of massage treatment and its effect.

Another type of device for medical treatment employing various elastic elements is also known in order to obtain the desired physical effects similar to those of finger-pressure therapy and the acupuncture. The devices of this type, however, has been designed to treat a local site of a human body and may not be employed for a general use. Even if such a device is employed for massage, it is too difficult to obtain a good massage effect making the stream of blood and lymph better.

BAD ORIGINAL



The inventor has also developed an efficient and economical air-massage device which utilizes an elastic element having a conventional medical effect, thereby to allow the reduction of an air quantity fed into the air inflatable bag so that a small type of air-feeding and
5 exhausting unit with a less capacity of a compressor may be employed.

Namely, it has been found out that a comfortable massage effect may be achieved by a device which combines an elastic contacting element for a direct massage action to a body portion with an air inflatable
10 bag for inflation and deflation with a compressed air, and is wound around a body portion such as a diseased site for feeding and exhausting air in relation to the bag. Thus, the elastic element comes into an even contact with the body portion and makes the massage effect uniform and comfortable.

15 Further, it has been found out that the attached equipments of the device may become smaller because the higher massage effect may be obtained with a less capacity of the bag using a less volume of the air.

20 The elastic element of the device may be constructed as another air bag which is optionally filled with an adjustable volume of air. Preferably, the elastic element is provided with a tongued and grooved face on a surface in contact with a body portion for enhancement of a massage effect. In this case, the element may be made of an elastic
25 material such as rubber or the like. Alternatively, the elastic element may be made of an elastic plate provided with a plurality of projections on the surface in contact with the body portion.

Further alternative is to provide the elastic element with a plurality
30 of independent air-filled projections on the surface.

Accordingly, a general object of the invention is to provide a device for air-massage having a change-over valve mechanism, which achieves smooth operation and a variety of air-feeding and exhausting operations
35 for a bag assembly combining a plurality of air inflatable bags, in spite of its simple construction.

A principal object of the invention is to provide a device for air-massage which comprises a plurality of associated air inflatable bags each having its own port for air-feeding and exhausting, a change-over valve mechanism connected to the bags for air-feeding and

5 exhausting in relation to each bag and air-feeding and exhausting means attached to the change-over valve mechanism, said bags being contacted with a given body portion and being moved sequentially in a wavy manner through an operation of said change-over valve mechanism for massaging an outer body surface.

10

One way of carrying out the invention is described in detail below with reference to drawings which illustrate preferred embodiments, in which :-

15

Figure 1 is a systematic diagram showing a fundamental construction of the air-massage device according to the invention,

Figure 2 is a perspective view of one embodiment of the air inflatable bag used in the invention,

Figure 3 is a cross sectional view of the bag taken along the line III - III of Figure 2,

20

Figure 4 is a perspective view of another embodiment of the bag,

Figure 5 is a cross sectional view of the bag taken along the line V - V of Figure 4,

Figure 6 is a perspective view of another embodiment of the bag used in the device according to the invention,

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Figure 7 is a pictorial view of the device of Figure 6 on actual use,

Figure 8 is a perspective view of the modified bag of Figure 6,

Figure 9 to 11 show different embodiments of the elastic element used with the air-inflatable bags,

30

Figures 12 (a) and (b) show one embodiment of the distributing plate of the change-over valve mechanism used in the air-massage device according to the invention, wherein Figure 12(a) is a plan view and Figure 12(b) is a sectional view taken along the line XII - XII of Figure 12(a),

35

Figure 13(a), (b) and (c) show rotators adapted to the distributing plate shown in Figure 12, wherein Figure 13(a) is a plan view,

Figure 13(b) is a sectional view taken along the line XIII -
XIII of Figure 13(a) and Figure 13(c) is a bottom view,
Figure 14 is a plan view showing operational condition of
the change-over valve mechanism shown in Figure 12 and 13,
5 Figure 15(a) to (f) are schematic views showing operational
conditions of the bags operated through the change-over valve
mechanism shown in Figure 14,
Figure 16 is a pictorial view of the device of the invention on
actual use, and
10 Figure 17 and 18 are partially broken perspective views of
other embodiments of the device according to the invention.

Figure 1 is a systematic view showing an overall construction of
the air-massage device according to the invention, in which the
15 reference numerals 10a and 10b represent bag assemblies
combining a plurality of air-inflatable bags. Each air-inflatable
bag 12 of the bag assemblies 10a and 10b is connected to pipes 16a
and 16b derived in branch from the change-over valves mechanism
14a and 14b to which is supplied through pressure regulator means
20 20a and 20b a compressed air generated by a compressor 18. The
regulated air pressure is detected by pressure gauges 21a and 21b.

Figures 2 and 3 show the preferred embodiments of the air
inflatable bag 12 used in the device of the invention, in which
25 the reference numeral 12 represents a flat air inflatable bag made of
air impermeable material. The bag 12 is provided with an port 22 for
connection with an air tube 24.

One surface of the bag 12 is combined with an elastic element 26
30 which may be constructed as another air bag. When the elastic element
26 is constructed as the air bag, the surface in contact with the body
portion may be flat (Figs. 2 and 3) or may be provided with the tongued
and grooved portions 28 for better massage effect (Figs. 4 and 5).
Further, the air bag 26 used as the elastic element is provided with
35 an air port 30 for adjustment of the air volume so as to control
elasticity of the elastic bag element 26.

In accordance with the air inflatable bag thus constructed, the elastic element 26 in contact with the body portion is independently arranged in relation to the bag 12 movable with the air pressure, so that uniform movement throughout the elastic element 26 is obtained, effecting the even massage action on the body portion contacted with the bag. Moreover, in accordance with the invention the role of the bag 12 is only to put air-pressure indirectly onto the elastic element 26 for movement of the latter, so that the total volume inside the bag 12 may be extremely reduced and that the volume of the air used becomes very small. As a result, a compact type of air-compressor may be employed for air feeding.

Figure 6 shows the device according to the invention, in which a plurality of the air inflatable bags 12 are combined with the single elastic element 26. Thus, in this embodiment the bags 12 are provided with their own ports 22 for the air-tubes 24 which are connected to the air source through a change-over valve mechanism 14 (see Figure 1), so that the time difference may be given between the adjacent bags and the wavy movement of the elastic element 26 may be obtained, resulting in the higher massage effect. In one utilization of this embodiment, as shown in Fig. 7, a plurality of the bags 12a, 12b, 12c ... are arranged in parallel in the shape of a mat, on the whole upper surface of which is partially or wholly spread the elastic element 26 and the body may be laid on the latter in order to enjoy a comfortable massage effect throughout the whole body. Moreover, in the case of using a plurality of the air inflatable bags 12, the elastic element 26 may be combined with a receiving bag 34 having a plurality of receptive areas 32 for holding these bags 12 so that the connecting and disconnecting operations of the bags 12 may be performed conveniently and the device may be conveniently handled.

Figures 9 to 11 show various embodiments of the elastic element 26 used in the device of the invention. In the elastic element 26 of Figure 9 there are arranged a plurality of projections 36 made of flexible rubber or plastic material. In Figure 10, the elastic element 26 with a plurality of the projections 38 is fabricated from relatively hard rubber or plastic material. While in Figure 11,

the elastic element 26 is provided with the projections 40 containing therein a fluid such as gas and water, a heating or cooling material in sol or gel form or a fluid in a particulate form, the projections being made of flexible rubber or plastic material.

5

The air inflatable bag 12 may be wound and fixed around the diseased part with the elastic element 26 in contact and air is fed to and exhausted from the bag 12, as described hereinafter, thereby achieving an even massage effect over the whole diseased
10 part around which the elastic element 26 is wound.

Besides the general usage of winding the bag 12 around the body portion, it may be constructed in the shape of the mattress for protection of bedsores or shaped into the article surrounding a
15 given portion, giving a variety of massage effects.

Alternatively, in the embodiments of Figures 2 to 5, a heating or cooling fluid material such as hot or cold water may be introduced into the elastic element 26 in the form of air bag for
20 alleviating a load of body surface and scattering pressure points as well as producing a warming or cooling action, thereby enhancing the massage effect. Instead of introduction of the hot or cold water, a heating or cooling element especially in a gel state may be filled into the inside of the elastic bag element
25 26 for the similar effect.

The change-over valve mechanism 14a, 14b used in the device of the invention will be described hereinbelow.

30 As shown in Figures 12 and 13, the change-over valve mechanism 14a, 14b comprises a distributing plate 44 for air-feeding and exhausting and two rotators 46 and 46' fitted to the distributing plate 44. Through the distributing plate 44 is bored a pair of three air-feeding and exhausting ports 42a, 42b, 42c and 42'a, 42'b, 42'c
35 circumferentially spaced apart equiangularly at 120° as well as passages 43 and 43' communicating with air-feeding pipes 16a and 16b.

Through the rotators 46 and 46', on the other hand, are bored passages 48 and 48' communicating with an air-feeding system as well as passages 50 and 50' communicating with an air-exhausting system.

5

The rotators 46 and 46' are, as shown in Figure 13, provided at their peripheries with gears 45, 45' and one of the rotators 46 is connected at its axis to a driving shaft of a motor M (not shown). Thus, the pair of rotators 46 and 46' may be rotated simultaneously
10 at the same speed through meshing of the gears 45 and 45'.

Now, the operation of each air-inflatable bag 12 of the bag assemblies 10a, 10b using the change-over valve mechanism 14 will be described hereinbelow.

15

As shown in Figure 14, when the change-over valve mechanism as shown in Figures 12 and 13 is employed the pair of rotators 46, 46' are rotated in the direction as shown by arrows so that
20 the air-feeding and exhausting ports 42a to 42c and 42a' to 42c' communicated through the pipes 16a, 16b with each air chamber of bag assemblies 10a and 10b may be sequentially communicated with the air-feeding passages 48, 48' and air-exhausting passages 50, 50' in the rotators 46, 46'. Thus, the air-feeding and exhausting
25 operation may be achieved, as shown in Figures 15a to 15f.

If the change-over valve mechanisms thusly constructed are connected in parallel to the same air-supplying source for operating two sets of the air-inflatable bags, one of which is operated for
30 air-feeding while the other is operated for air-exhausting, then the alternate and sequential operations may be smoothly achieved. Upon operation of this type of the device, pressure regulators 20a and 20b may be arranged for adjusting the supplied air pressure. Thus, the massage on the body portion using different
35 massaging pressures or the usage of the two sets of the air-inflatable bags of different volumes may be possible so that the single device may serve as two air-massage devices.

Furthermore, a plurality of the bags or bag assemblies may be wound around arms and/or legs for simultaneous air-feeding and exhausting, thereby affording a variety of good massage treatments and their effects. In this embodiment, the rotators
5 of the change-over valve mechanisms may be rotated in any direction and/or at any speed so that any desired massage treatment may be readily achieved. (Figure 16).

Figure 17 shows the utilization example of the device, in which
10 the air inflatable bag 12 or the bag assembly 10 is shaped into an article such as a shoe surrounding a given body portion such as a leg, to the partial or whole inner surface of which is connected the elastic element 26. With use of this embodiment the better massage effect may be expected for the free end portions of the
15 human body.

Figure 18 illustrates another utilization example of the device, in which a plurality of air inflatable bags 12a to 12c are arranged separably, which are combined with the respective
20 independent elastic elements 26a to 26c and attached to different body portions for setting the air pressure of each bag 12a - 12c in time difference and causing wavy movement.

Furthermore, in accordance with the invention the elastic element
25 26 may be releasably combined with the air inflatable bag 12 or bag assembly 10, thereby a number of combinations are possible between the various embodiments of the elastic elements 26 and the air inflatable bags 12, giving a wide variety of massage effects.

30 Besides the foregoing embodiments, the change-over valve mechanism may comprise a plurality of solenoid valves provided for a plurality of air-feeding means communicated with a common compressed air source and the air-feeding means may be communicated
35 with a plurality of air-feeding and exhausting ports of the air inflatable bags for controlling the operation through the solenoid valves.

The device according to the invention has a simple construction which can be manufactured at a low cost and the size and cost of the attached equipments may be reduced, so that the device can be readily and conveniently employed not only for an expert but also
5 for a general home use.

The foregoing is to be considered as descriptive and not limitative as many changes and modifications can be made without departing from the spirit and scope of the invention.
10

Claims :

1. A device for air-massage which comprises a plurality of associated air inflatable bags (12) each having its own port for air-feeding and exhausting, a change-over valve mechanism (14) connected to the bags for air-feeding and exhausting in relation to each bag, and air-feeding and exhausting means (44, 46) attached to the change-over valve mechanism, said bags being contacted with a given body portion and being moved sequentially in a wavy manner through an operation of said change-over valve mechanism for massaging an outer body surface.
2. A device as claimed in claim 1, wherein said plurality of air inflatable bags (12) are assembled in a mattress form.
3. A device as claimed in claim 1, wherein said plurality of air inflatable bags (12) are formed into a shaped article surrounding a given body portion.
4. A device as claimed in claim 1, wherein said plurality of air inflatable bags (12) are combined separatably.
5. A device as claimed in any of the preceeding claims, wherein each of said air inflatable bags (12) is flat and an elastic element (26) is attached to one side of the bags by use of connecting means.
6. A device as claimed in claim 5, wherein said elastic element (26) is formed as an air inflatable bag which is adjustably filled with air.
7. A device as claimed in claim 5 or 6, wherein said elastic element (26) is provided at its contacting surface to a body portion with unevenness (28).
8. A device as claimed in claim 5, wherein said elastic element (26) comprises an elastic plate having a number of projections (36, 38) on its contacting surface to a body portion.

9. A device as claimed in any of claims 5 to 8, wherein said elastic element (26) is provided at its contacting surface to a body portion with a number of independent air-filled projections (40).

5

10. A device as claimed in any of claims 5 to 9, wherein said elastic element (26) is detachably connected to the air inflatable bags (12).

10 11. A device as claimed in any of claims 5 to 10, wherein said elastic element contains therein a heating and/or cooling element.

12. A device as claimed in claim 1, wherein said change-over valve mechanism (14) comprises a distributing plate (44)

15 provided circumferentially and equiangularly with a plurality of air-feeding and exhausting ports (42), rotators (46) contacted concentrically with the distributing plate and provided with passages (48, 50) communicating with the air-feeding and exhausting means, and a means for driving the rotators, said plurality of
20 air-feeding ports of the distributing plate being connected through respective tubes to a plurality of air-feeding and exhausting ports (22) of the air inflatable bags (12).

13. A device as claimed in claim 1, wherein said change-over valve
25 mechanism (14) comprises a plurality of solenoid valves provided for a plurality of air-feeding means communicating with a common compressed air source, each of said air-feeding means being communicated with each air-feeding and exhausting port of said plurality of air-inflatable bags.

30

14. A device as claimed in claim 12, wherein said change-over valve mechanism (14) comprises a set of valve mechanisms in which each distributing plate (44) is provided equiangularly spaced apart at approximately 120° with three air-feeding and exhausting
35 ports (42a, 42b, 42c) and each rotator (46) is provided with the

passage (48) and the passage (50), said former passage (48) being communicated with the air-feeding means corresponding to either one of the air-feeding and exhausting ports provided for the distributing plate (44) and said passage (50) being communicated with the air-
5 exhausting means corresponding to all the remaining air-feeding and exhausting ports.

15. A device as claimed in claim 12, wherein a plurality of rotators (46) each having a gear (45) at its periphery are arranged
10 for synchronuous rotation through meshing of gears, said rotators being driven with an alternating or direct current motor.

16. A device as claimed in claim 12, 14 or 15, wherein said air-feeding means comprises an air compressor (18) and an air
15 pressure regulator (20).

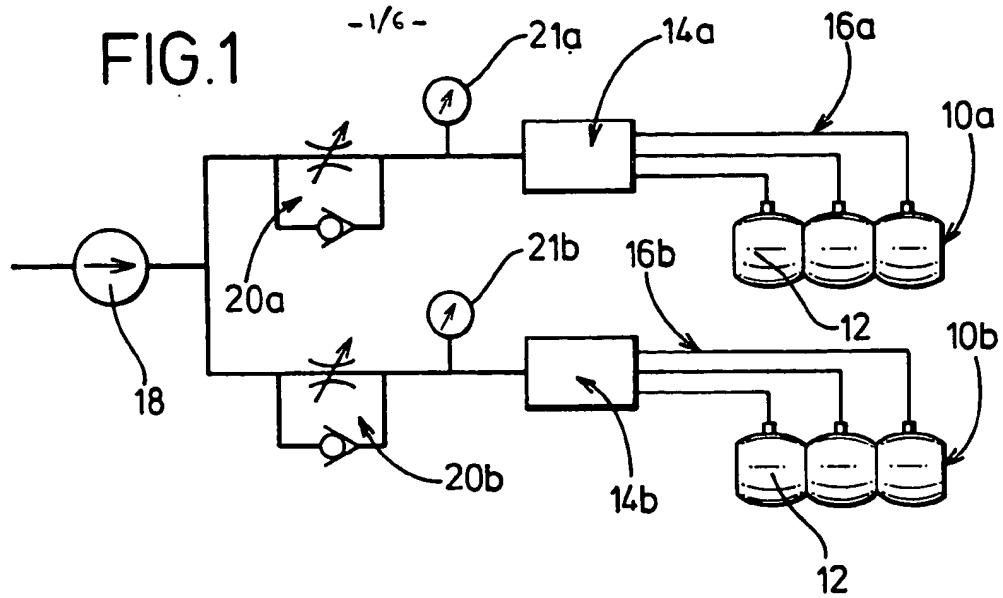


FIG. 2

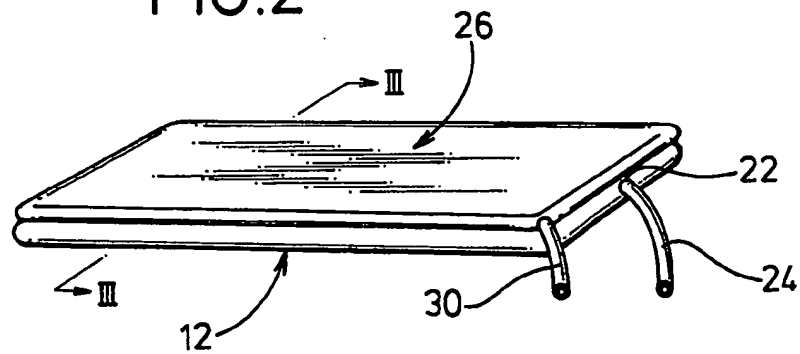


FIG. 3

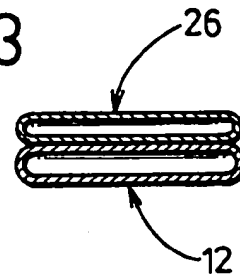


FIG. 4

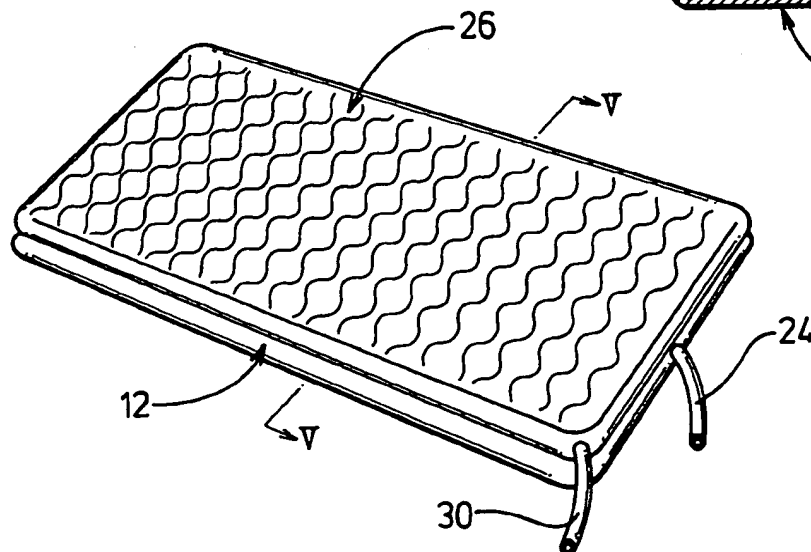


FIG.5

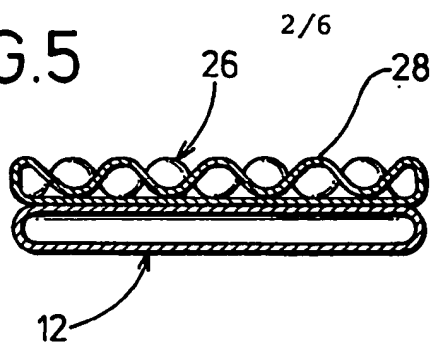


FIG.6

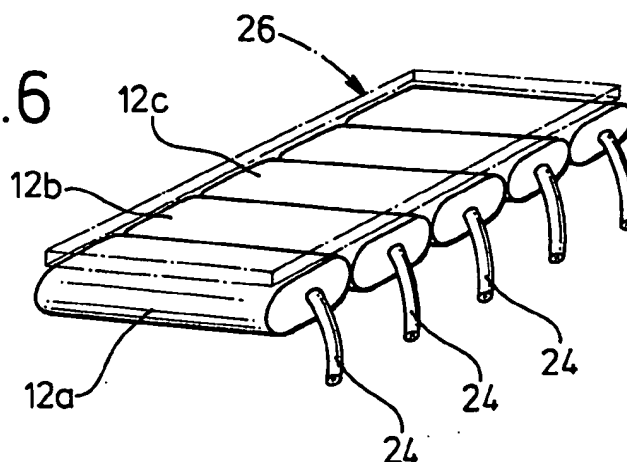


FIG.7

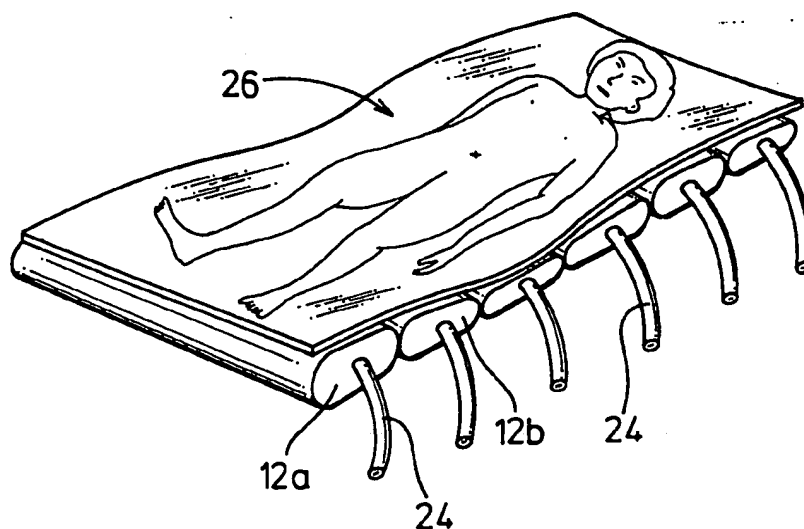


FIG.8

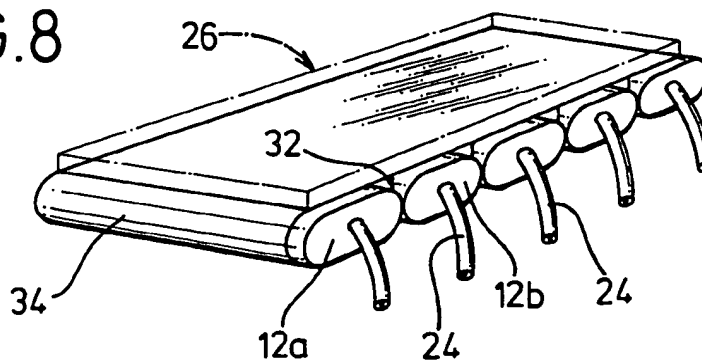


FIG.9

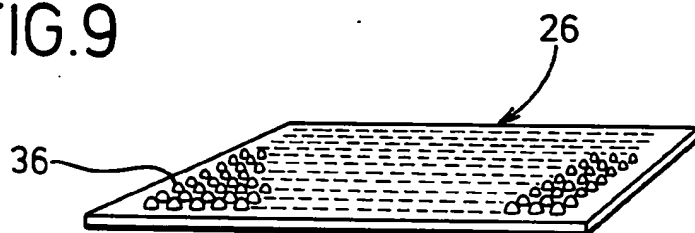


FIG.10

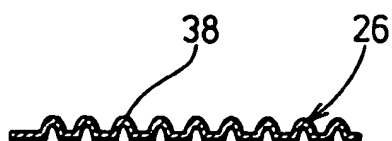


FIG.11

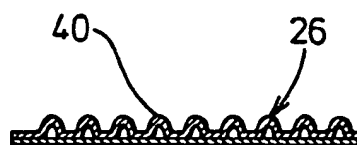


FIG.12

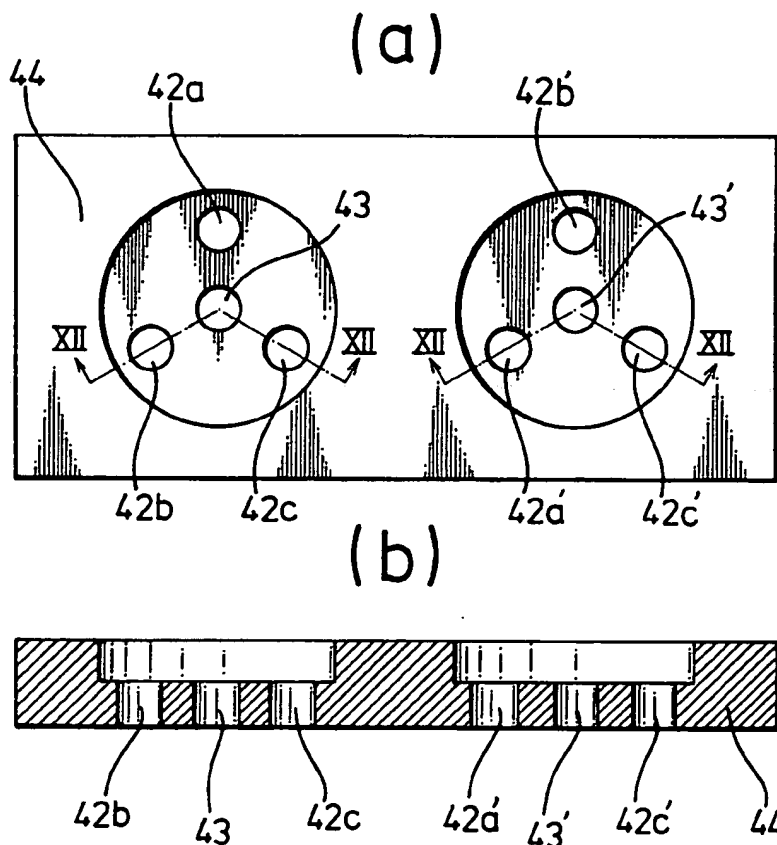


FIG.13

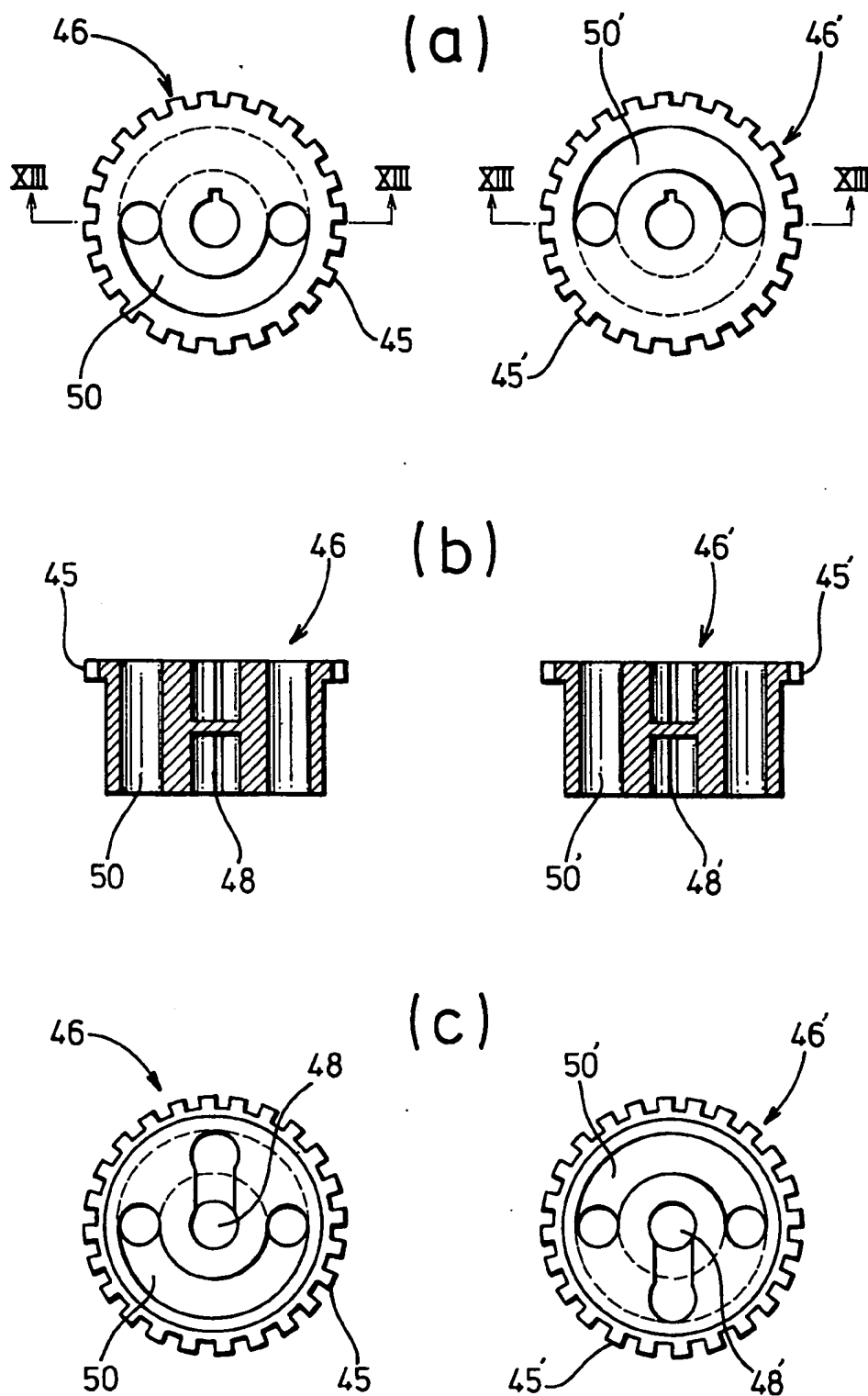


FIG.14

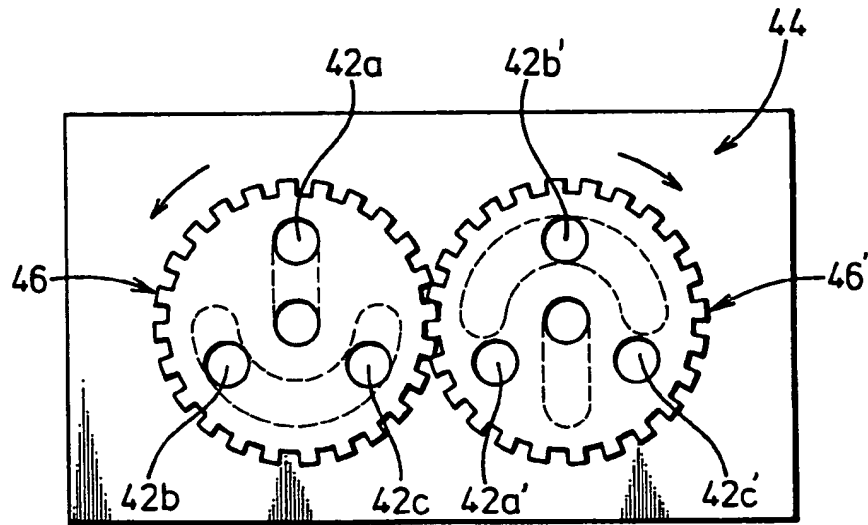


FIG.15

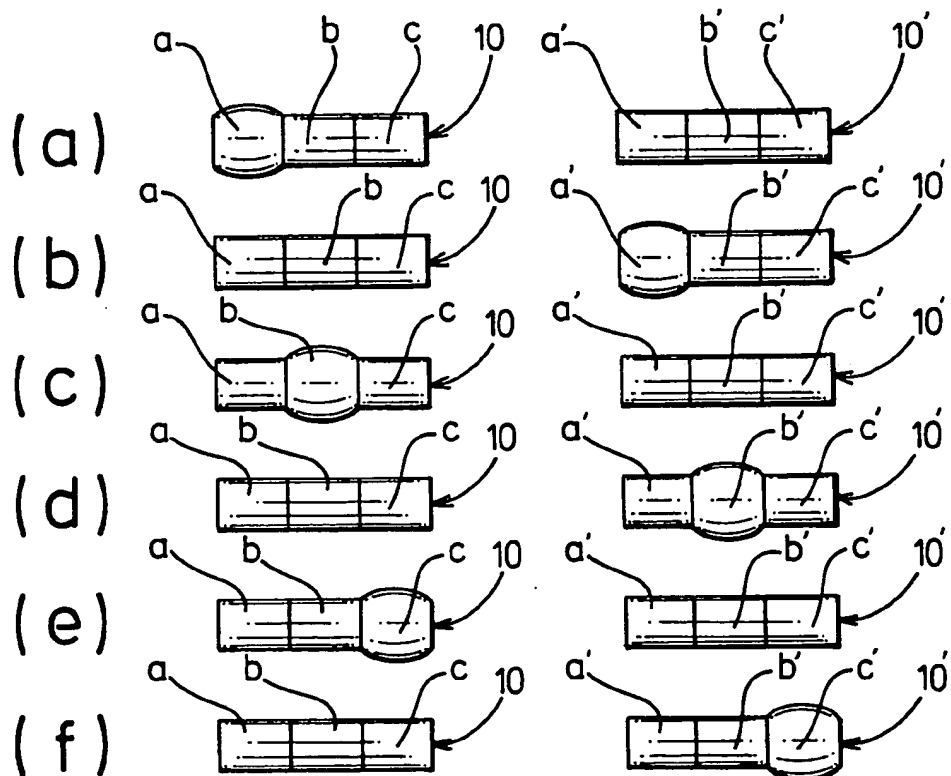


FIG.16

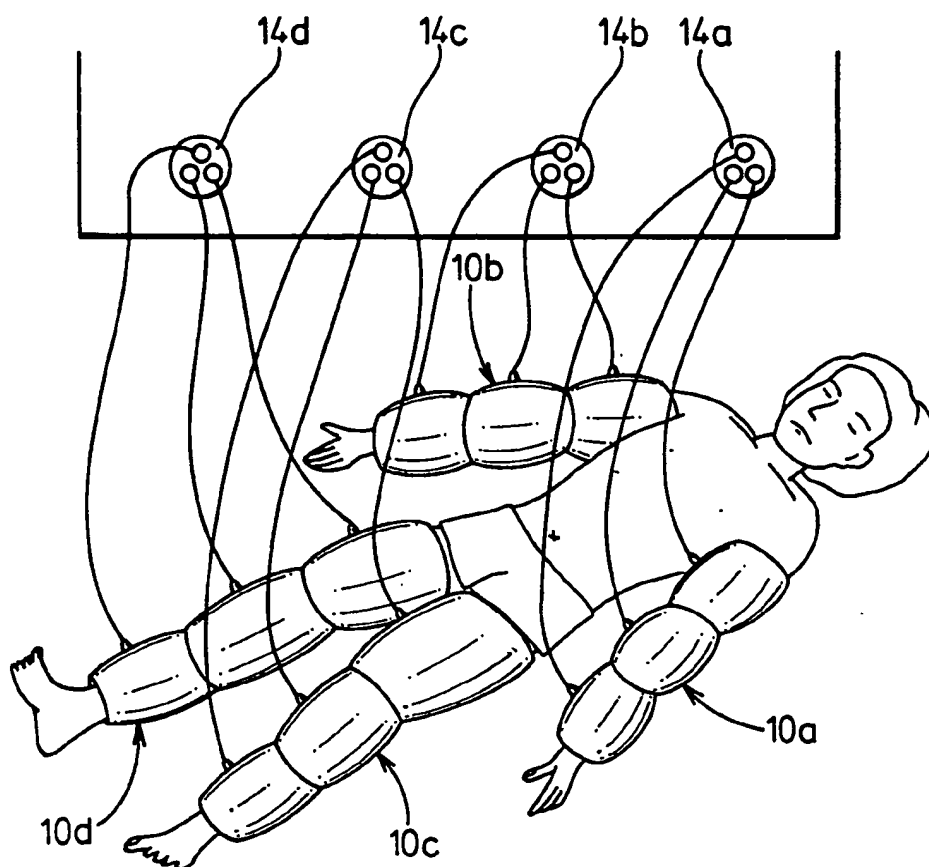
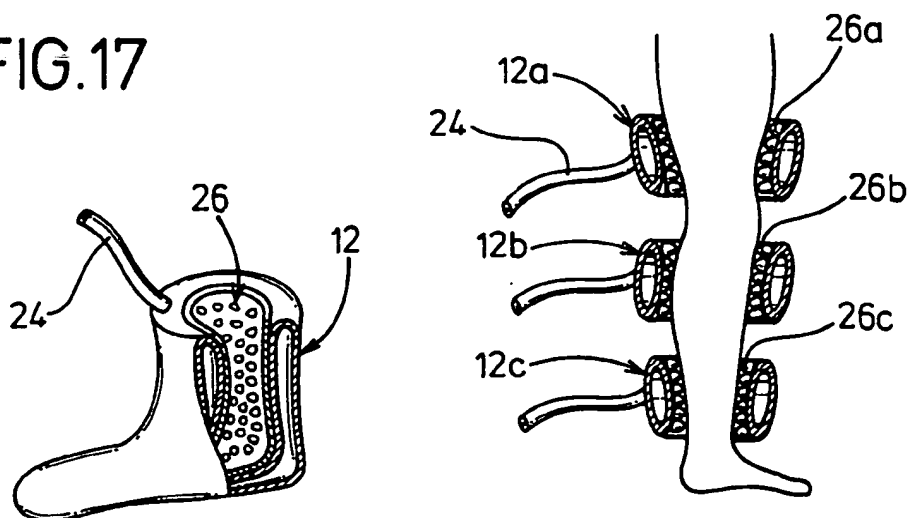


FIG.18

FIG.17





European Patent
Office

EUROPEAN SEARCH REPORT

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DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl.)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
X	<u>US - A - 2 533 504</u> (POOR) * column 3, lines 5 to 41; column 4, line 71 to column 6, line 43; fig. 1,4,6,9,10,14, positions 12,14,30, 141,153,154,156,157,158,159 *	1,3,4, 12,14, 16	A 61 H 23/04 A 61 H 9/00
X	<u>US - A - 3 177 866</u> (WESSLUND) * fig. 1, 2, 9, 11 *	1,3,4, 12	
X	<u>FR - A1 - 2 267 751</u> (TISSOT) * claims; page 2, line 32; page 3, line 13; fig. 3 *	1-3,13	TECHNICAL FIELDS SEARCHED (Int.Cl.)
X	<u>FR - A1 - 2 313 908</u> (FONTRIER) * whole document *	1-3,13	A 61 H 9/00 A 61 H 23/04
X	<u>US - A - 1 608 239</u> (ROSETT) * claim 1; fig. 1 to 4 *	1,3	
X	<u>US - A - 3 862 629</u> (ROTTA) * column 2, paragraph 2; column 4, paragraph 3; fig. 1 *	1,3	
X	<u>FR - A - 1 601 003</u> (CONTI) * page 8; fig. 7, 8 *	1,3	CATEGORY OF CITED DOCUMENTS
	<u>GB - A - 2 002 235</u> (KENDALL CO.) * page 1, lines 121 to 128; fig. 1,3, 4, positions 29, 48a to f *	1,3,5, 10	X: particularly relevant A: technological background O: non-written disclosure P: intermediate document T: theory or principle underlying the invention E: conflicting application D: document cited in the application L: citation for other reasons
X The present search report has been drawn up for all claims			&: member of the same patent family, corresponding document
Place of search Berlin		Date of completion of the search 09-06-1980	Examiner DROPMANN



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